

A+ Guide to Hardware: Managing, Maintaining, and Troubleshooting, 5e

Chapter 11 *Supporting Notebooks*

Objectives

- Learn about special considerations when supporting notebooks that are different from supporting desktop computers
- Learn how to install, configure, optimize, troubleshoot, and repair peripheral devices used with notebooks
- Learn how to troubleshoot, upgrade, and replace internal notebook components

Special Considerations When Supporting Notebooks

- Notebook (laptop): portable computer
 - Varieties: tablet PCs and netbooks
- Comparing notebooks to full-sized computers
 - Support requires same skills
 - Built as a single system with modifications
 - Smaller, portable, and uses less power
 - Replacement parts cost more
- Factors to consider
 - Warranty, service manuals, and diagnostic software
 - Customized OS installation, and obtaining parts

Warranty Concerns

- Do not void warranty
 - Opening case, removing part labels, installing other-vendor parts, upgrading OS, disassembling
- Contacting technical support: information needed
 - Notebook model and serial number
 - Purchaser name, phone number, address
- Service options
 - On-site
 - Ship to authorized service center
 - Phone assistance



Figure 11-2 The model and serial number stamped on the bottom of a notebook are used to identify the notebook to service desk personnel. Courtesy: Course Technology/Cengage Learning

Service Manuals and Other Sources of Information

- Service manuals save time
 - Enables safe notebook disassembly
- Locating documentation
 - Manufacturer's physical manual
 - Internet
 - Manufacturer's Web site
 - Third party websites
- User manual
 - Provides basic maintenance tasks

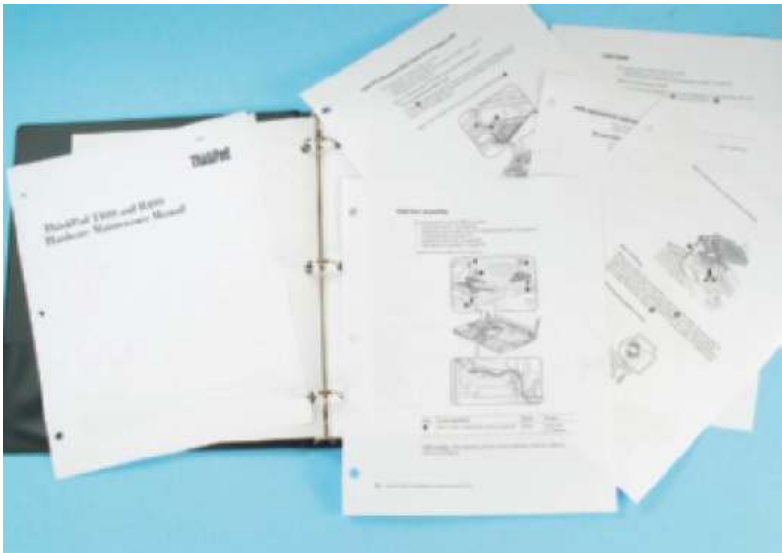


Figure 11-3 A notebook service manual tells you how to use diagnostic tools, troubleshoot a notebook, and replace components. Courtesy: Course Technology/Cengage Learning



Figure 11-4 The Compaq Web site (www.hp.com) provides detailed instructions for troubleshooting and replacing components. Courtesy: Course Technology/Cengage Learning

Diagnostic Tools Provided By Manufacturers

- Pinpoints problem components
 - Sources:
 - Manufacturer's Web site
 - CDs bundled with the notebook
 - Hard drive or floppy disk
 - Example: PC-Doctor
 - Included with Lenovo, IBM ThinkPad, Fujitsu, and HP notebooks
 - Can be purchased separately

The OEM Operating System Build

- Operating system preinstalled at the factory
 - Original equipment manufacturer (OEM)
 - OS Build
 - Customized installation of the OS
 - Proprietary drivers
 - Customized diagnostic software
- Use caution when upgrading to new OS

The OEM Operating System Build (cont'd.)

- Recovery CDs and recovery partitions
 - Contains installable version of OS preinstalled on the notebook
 - Provided by manufacturer
 - CD bundled with PC or requested from manufacturer
 - Hard drive partition can contain OS
 - May be hidden
 - Files protected from access
 - See user manual for access
 - Additional software on CD
 - Drivers and application setup programs

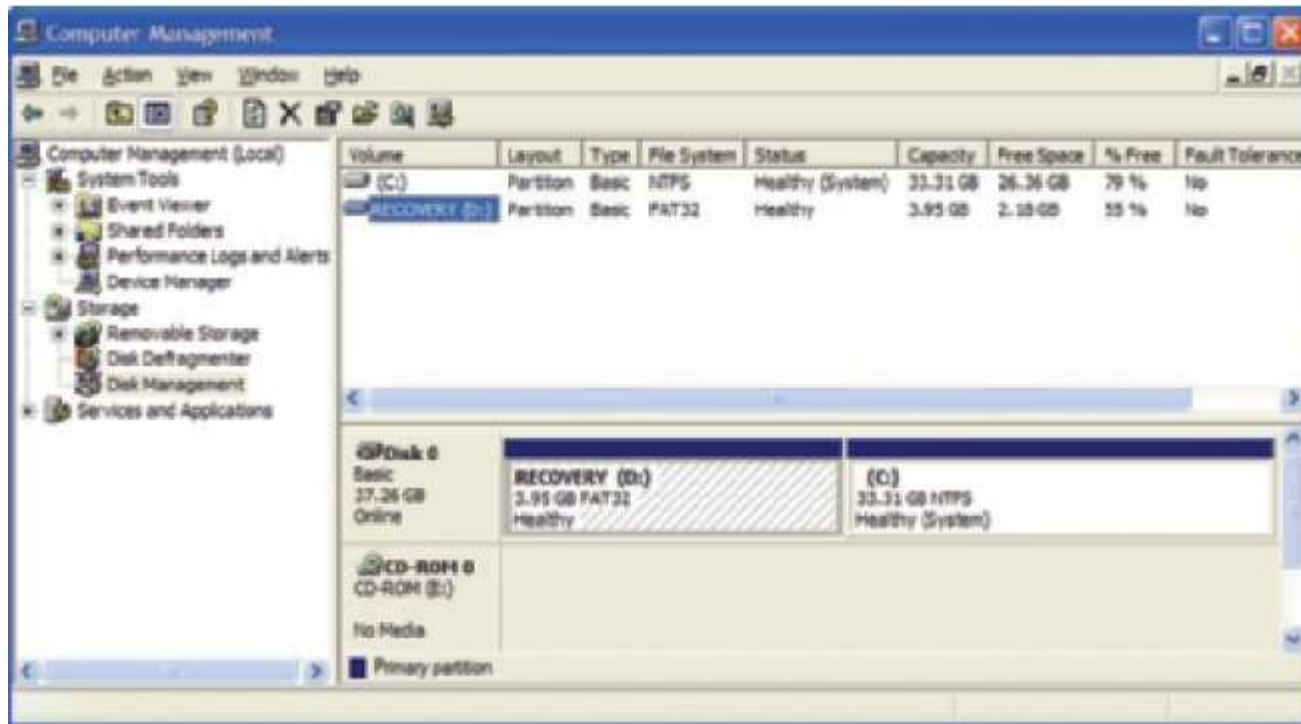


Figure 11-6 This notebook hard drive has a recovery partition that can be used to recover the system. Courtesy: Course Technology/Cengage Learning

The OEM Operating System Build (cont'd.)

- Operating system upgrades
 - Perform only if necessary
- Tips:
 - Upgrade using OS build from the OEM
 - Ensure supporting device drivers included
 - Follow OEM's specific instructions
- Off-the-shelf OS advice:
 - Verify system component compatibility
 - Ensure device drivers available
 - Flash BIOS before upgrade, if necessary

Caring For Notebooks

- General guidelines:
 - Do not touch LCD panel with sharp objects
 - Do not connect notebook to phone line in a storm
 - Use OEM recommended battery packs
 - Use passwords with each Windows user account
 - Do not tightly pack in a suitcase
 - Do not pick up or hold by the display panel
 - Do not move while hard drive is being accessed
 - Do not put close to appliances generating strong magnetic field

Caring For Notebooks (cont'd.)

- General guidelines: (cont'd.)
 - Keep OS current
 - Never use public connection without a software firewall
 - Keep notebook at a controlled temperature
 - Keep away from smoke, water, sand
 - Do not power up and down unnecessarily
 - Do not power on unless at room temperature
 - Protect notebook against ESD
 - Remove CD/DVD before traveling
 - Take precautions if notebook gets wet

Caring For Notebooks (cont'd.)

- Cleaning tips:
 - Do not disassemble for routine cleaning
 - Clean LCD panel with a soft dry cloth
 - Use compressed air
 - Keyboard, track ball, touch pad, air vents, sticking keys
 - Use contact cleaner
 - Under key caps
 - Battery connections

Supporting Notebook Peripheral Devices

- Ports on the back or sides for connecting peripherals

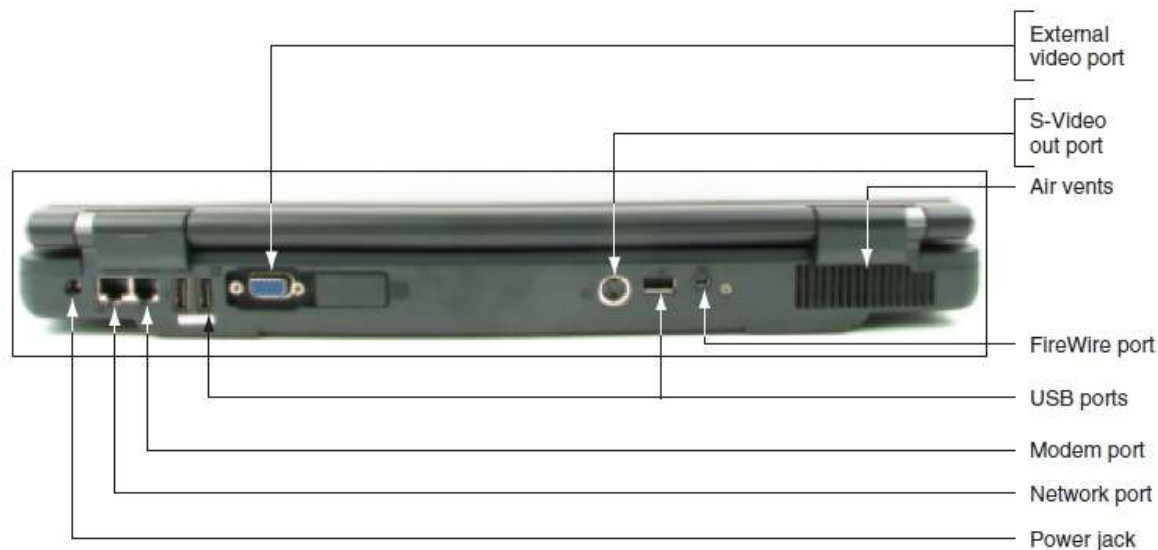


Figure 11-8 Ports on the back of a notebook
Courtesy: Course Technology/Cengage Learning

Port Replicators and Docking Stations

- Port replicator
 - Easy connection to full-sized monitor, keyboard, AC power adapter, and other devices
- Docking station
 - Same functions as port replicator
 - Additional slots for adding secondary storage devices and expansion cards
- Hardware profiles
 - XP: enables storage of hardware configurations
 - Vista: not required

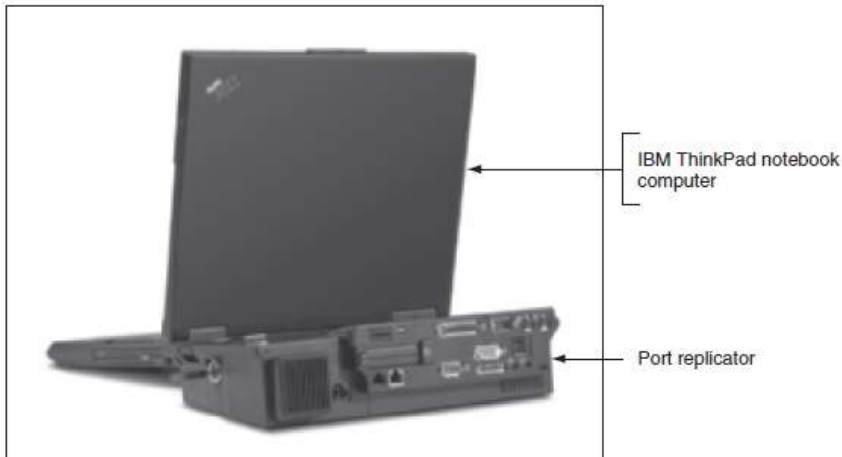


Figure 11-10 A port replicator makes it convenient to connect a notebook computer to resources and peripherals at your office. Courtesy of IBM Corporation



Figure 11-11 A docking station can provide extra secondary storage for a laptop. Courtesy of IBM Corporation

PC Card, CardBus, and ExpressCard Slots

- Connect peripheral devices to notebooks
- Personal Computer Memory Card International Association (PCMCIA)
 - Develops standards for PC card slots
- PCMCIA cards
 - Used in many devices
 - Include variations of PC Card, CardBus, ExpressCard
 - Three standards pertaining to size and thickness
 - Type 1, Type II, Type III

PC Card, CardBus, and ExpressCard Slots (cont'd.)

- PC Card slot technologies
 - 16-bit ISA and 32-bit PCI
- CardBus
 - Increases bus width to 32 bits
 - Backward compatible with earlier standards
- ExpressCard matches PCI Express and USB 2.0
 - Two sizes: ExpressCard/34 and ExpressCard/54
 - Not backward compatible
 - Hot-pluggable, hot-swappable, and supports autoconfiguration

PC Card, CardBus, and ExpressCard Slots (cont'd.)

- Windows services for PC Card or ExpressCard
 - Socket service and card service
- Removing card from PC card or ExpressCard slot
 - Click Unplug or Eject Hardware icon in system tray
 - Click Stop to open Stop a Hardware device dialog box
 - Click OK and proceed to eject the card
- Tips:
 - Ensure system turned on when inserting card
 - Install drivers before inserting card

Using Bluetooth, Cellular, and Wi-Fi Connections

- Embedded wireless network adapter
 - Connects Wi-Fi network
- Bluetooth or infrared adapter
 - Supports personal area network (PAN)
- Supporting Wi-Fi connections
 - Internal wireless adapter uses internal antenna
 - External wireless adapter may need external antenna

Using Bluetooth, Cellular, and Wi-Fi Connections (cont'd.)

- Supporting Bluetooth connections
 - Verify wireless switch turned on
 - Verify Windows sees Bluetooth enabled
 - Download all windows updates
 - Look in Device Manager for errors
 - Make sure other device has Bluetooth turned on
 - Lower Bluetooth software security mode
 - Uninstall and reinstall the Bluetooth drivers
 - Use manufacturers websites

Using Bluetooth, Cellular, and Wi-Fi Connections (cont'd.)

- Supporting Cellular WAN Connections
 - Notebook WiMAX device
 - ExpressCard or PC Card slot or USB port
 - Internet card (air card)
 - Device connecting to a cell phone network
 - Mobile broadband Internet access on a 3G network
 - Use Internet card and mobile service

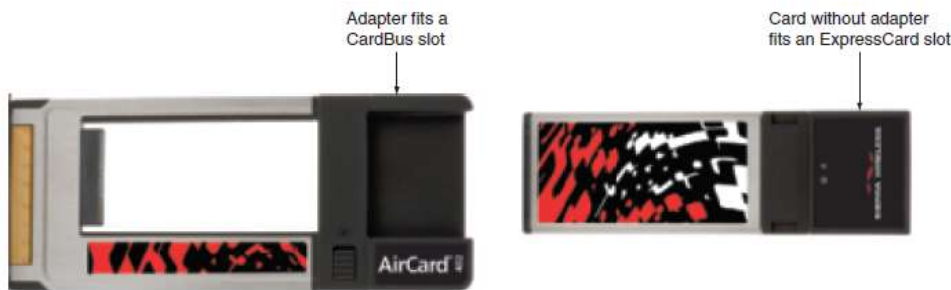


Figure 11-23 Sierra Wireless AirCard 402 modem card fits a PC Card or ExpressCard slot
Courtesy of Sierra Wireless

Using Bluetooth, Cellular, and Wi-Fi Connections (cont'd.)

- Troubleshooting cellular WAN connection
 - Check Device Manager and Event Viewer
 - Install Windows updates
 - Reinstall software
 - Check cellular WAN provider Web site
 - Check notebook and Internet card manufacturer websites
 - Activate card in the service provider coverage area
 - Verify software firewall allows application access

Power and Electrical Devices

- Notebook power sources
 - AC adapter, DC adapter, battery pack
- Auto-switching AC adapter feature
 - Device automatically switches from 110 V to 220 V AC power
- Types of batteries:
 - Ni-Cad (nickel-cadmium)
 - NiMH (nickel-metal-hydride)
 - Lithium Ion
 - Direct Methanol Fuel Cell (DMFC): experimental

Power and Electrical Devices (cont'd.)

- Notebook power needs
 - One or more batteries, a DC adapter for travel, an AC adapter at home and for recharging the batteries
 - Inverter changes DC to AC



Figure 11-25 An inverter changes DC to AC and provides an outlet for your laptop's AC adapter
Courtesy: Course Technology/Cengage Learning

Power and Electrical Devices (cont'd.)

- General dos and don'ts:
 - Use extra battery packs
 - Learn how to recharge, use, and store a battery
 - Use OS power-management features
 - Connect to electrical outlet to use DVD or burn a CD
 - Use standby and hibernate modes
 - Plug into AC/DC outlet upon battery low message
 - Reduce LCD panel brightness to conserve power
 - Use external surge protector
 - Verify notebook has power

Power Management

- ACPI-compliant BIOS helps manage power
 - Minimize power consumption
 - Varying degrees of suspend or sleep modes
- Vista power-saving states
 - Sleep mode: corresponds to ACPI S3 mode
 - Hibernation: work is saved to hard drive and powers system down
 - Hybrid sleep: work is saved to hard drive and system maintains a trickle of power
- Windows XP standby corresponds to ACPI S3 mode

Power Management (cont'd.)

- Managing power in Windows
 - Vista: Power Options window
 - XP: Power Options Properties dialog box
 - Example: hibernates after set time
- Wake on LAN
 - Wired or wireless network activity powers up or wakes up computer
 - Feature must be enabled in BIOS setup
 - Network adapter or wireless network adapter must be configured to wake the computer

Input Devices

- Keyboard: primary laptop input device
- Common laptop pointing devices
 - Touch pad, TrackPoint or point stick, USB wired or wireless mouse, and graphics tablet



Figure 11-37 The touch pad is the most common pointing device on a notebook
Courtesy: Course Technology/Cengage Learning

Input Devices (cont'd.)

- Graphics tablet (digitizing tablet or digitizer)
 - Uses a USB port and stylus that works like a pencil



Figure 11-39 A graphics tablet and stylus are used to digitize a hand drawing. Courtesy: Course Technology/Cengage Learning

Input Devices (cont'd.)

- Adjust touch pad or TrackPoint
 - Mouse Properties box:
 - Adjust pointer speed, mouse trails, pointer size, how the touch pad buttons work, other settings for pointing devices
- Tablet PCs
 - Stylus controlled from the Pen and Input Devices box
 - Accessed from Vista or XP Control Panel
- Pointing device software provides utility to manage the device

Video

- Laptop video system
 - LCD panel
 - Video controller
 - Embedded on motherboard
 - Video card installed as an internal component
- Laptop ports
 - Analog 15-pin VGA port
 - External monitor
 - S-Video Out port
 - Allows television as an external display device

Video (cont'd.)

- Troubleshooting problems with video
 - LCD panel shows a black screen and power light on
 - Verify LCD cutoff switch or button on
 - Use an external monitor to check Device Manager and Event Viewer
 - Update video drivers
 - Potential problem with LCD panel assembly
 - Verify LCD panel display settings
 - Update video drivers
 - Adjust brightness

Troubleshooting, Replacing, and Upgrading Internal Parts

- Topics:
 - Alternatives to consider before taking on complex repair projects
 - How to upgrade memory
 - How to exchange a drive
 - How to perform other complex repair projects
 - Exchanging an LCD panel or motherboard

Three Approaches to Dealing with a Broken Internal Device

- Factors to consider before starting repair project:
 - Time the repair will take
 - Alternatives to fixing (upgrading)
 - Return notebook to OEM or service center
 - Substitute external component for internal device
 - Replace the internal device

Three Approaches to Dealing with a Broken Internal Device (cont'd.)

- Substitute internal device with an external device
 - Disable internal device within BIOS setup
 - Install external peripheral device
- Preparation for servicing notebook
 - Back up important data if possible
 - Protect against ESD
 - Remove PC Cards, CDs, and DVDs
 - Turn off attached devices, and shut down notebook
 - Disconnect AC adapter
 - Undock (if necessary) and remove the battery

Upgrading Memory

- Memory used in notebooks
 - SO-DIMMs (small outline DIMMs)
 - SO-RIMMs (small outline RIMMs)
 - MicroDIMMs
 - Smaller than SO-DIMMs and have a 64-bit data path

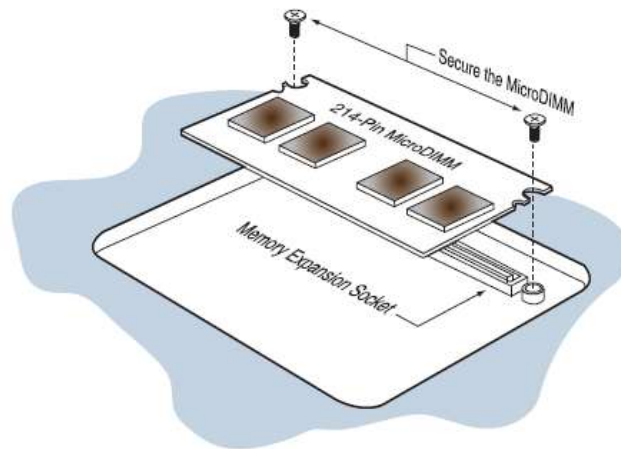


Figure 11-45 Installing a MicroDIMM in a subnotebook computer
Courtesy: Course Technology/Cengage Learning





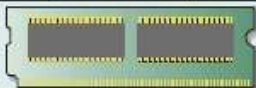

Memory Module Description	Sample Memory Module
2.66" 204-pin SO-DIMM contains DDR3 memory. The one notch on the module is offset from the center of the module.	 <p>Courtesy of Kingston Technology Corporation</p>
2.66" 200-pin SO-DIMM contains DDR2 SDRAM. One notch is near the side of the module.	 <p>Courtesy of Kingston Technology</p>
2.66" 200-pin SO-DIMM contains DDR SDRAM. One notch near the side of the module is slightly offset from the notch on a DDR2 SDRAM module.	 <p>Courtesy of Crucial Technology</p>
2.66" 144-pin SO-DIMM contains SDRAM and is outdated. One notch is slightly offset from the center of the module.	 <p>Courtesy of Crucial Technology</p>
2.35" 72-pin SO-DIMMs are outdated. They contain FPM or EDO memory and have no notch on the edge connector.	 <p>Courtesy: Course Technology/Cengage Learning</p>
160-pin SO-RIMM contains Rambus memory and has two notches.	 <p>Courtesy of High Connection Density, Inc.</p>

Table 11-2 Memory modules used in notebook computers

Upgrading Memory (cont'd.)

- How to upgrade notebook memory:
 - Upgrade process is similar to desktops
 - Considerations:
 - Make sure warranty not being voided
 - Search for best buy on a suitable and authorized part
 - General steps:
 - Decide how much memory to upgrade
 - Purchase memory
 - Install it

Replacing a Hard Drive

- General guidelines:
 - Check with OEM for drive sizes and connector types
 - Be aware of voiding manufacturer's warranty
 - Watch for proprietary form factors and connectors
- Shopping:
 - Notebook drive: 2.5 inches wide
 - May use SSD (solid state device) technology
 - Hard drives connector: SATA connector or 44-pin IDE
 - IDE drive may use adapter to interface between proprietary connector and motherboard 44-pin IDE connector

Replacing a Hard Drive (cont'd.)

- Issues to consider before replacing hard drive:
 - Old drive crashed
 - Recovery CD and notebook drivers CDs required
 - Upgrade: must transfer data from old drive to new one
 - Older notebook computers required disassembly
- Newer notebooks: easy to replace
 - If BIOS setup uses autodetect:
 - System boots up and BIOS recognizes new drive
 - Searches for an operating system
 - If a new drive: boot from Windows recovery CD



Figure 11-53 This one screw holds the hard drive in position
Courtesy: Course Technology/Cengage Learning



Figure 11-54 Push the drive out of its bay
Courtesy: Course Technology/Cengage Learning

Disassembling and Reassembling a Notebook Computer

- Requires special tools and extra patience



Figure 11-55 To protect the system against ESD, attach the alligator clip of a ground strap to an I/O port on the back of the notebook. Courtesy: Course Technology/Cengage Learning



Figure 11-56 Tools for disassembling a notebook computer. Courtesy: Course Technology/Cengage Learning

Disassembling and Reassembling a Notebook Computer (cont'd.)

- Many small screws of various sizes, lengths
- Work methodically:
 - Keep screws and components organized
 - Place screws in a pillbox (label each compartment)
 - Place screws on soft padded work surface
 - Use white labeling tape
 - Place screws on notebook paper
 - Write where screw belongs
 - Tape screw beside manufacturer documentation
 - Keep notes to help with reassembly



Figure 11-58 Using a notepad can help you organize screws so you know which screw goes where when reassembling
 Courtesy: Course Technology/Cengage Learning



Figure 11-59 Tape screws beside the step in the manufacturer documentation that told you to remove the screw. Courtesy: Course Technology/Cengage Learning

Disassembling and Reassembling a Notebook Computer (cont'd.)

- Disassembly tips:
 - Find the hardware service manual
 - Consider the warranty
 - Take the time necessary, do not force anything
 - Protect against ESD
 - Understand ZIF connectors
 - Pry up plastic covers with dental pick or small screwdriver
 - Plastic screws may be used only once
 - Disassemble components in order

Disassembling and Reassembling a Notebook Computer (cont'd.)

- Reassembly tips:
 - Reassemble notebook in the reverse order
 - Tighten, but not over tighten, all screws
 - Before installing the battery or AC adapter verify there are no loose parts inside the notebook

Disassembling and Reassembling a Notebook Computer (cont'd.)

- Replacing the keyboard:
 - Power down and unplug notebook
 - Remove screws on notebook bottom
 - Open Lid
 - Push keyboard toward lid while pulling it up to release it from the case
 - Bring keyboard out of the case and forward
 - Expose keyboard ribbon cable
 - Use screwdriver to lift cable connector up and out
 - Replace keyboard following steps in reverse order

Disassembling and Reassembling a Notebook Computer (cont'd.)

- Replacing optical drives:
 - Remove keyboard
 - Remove screw holding DVD drive to notebook
 - Slide drive out of the bay and new drive into the bay
 - Ensure connection with drive connector
 - Replace the screw
- Replacing expansion cards:
 - Newer notebook use Mini PCI Express slots
 - Three types: Type I, Type II, Type III
 - Older notebooks use a Mini PCI slot

Disassembling and Reassembling a Notebook Computer (cont'd.)

- Steps to remove a Mini PCIe wireless network card:
 - Disconnect antenna from Wi-Fi card
 - Remove the one screw at the top of the card
 - Pull card forward and out of the slot

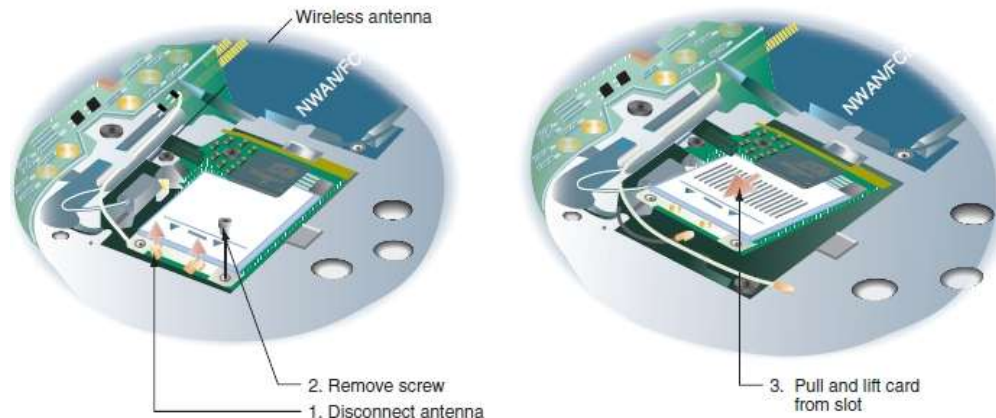


Figure 11-70 How to remove a Mini PCI Express card
Courtesy: Course Technology/Cengage Learning

Disassembling and Reassembling a Notebook Computer (cont'd.)

- Remove a Mini PCI wireless network card:
 - Remove hinged cover and keyboard
 - Disconnect cable to the wireless antenna
 - Pull outward on the securing tabs
 - After card pops, lift it out of the cavity

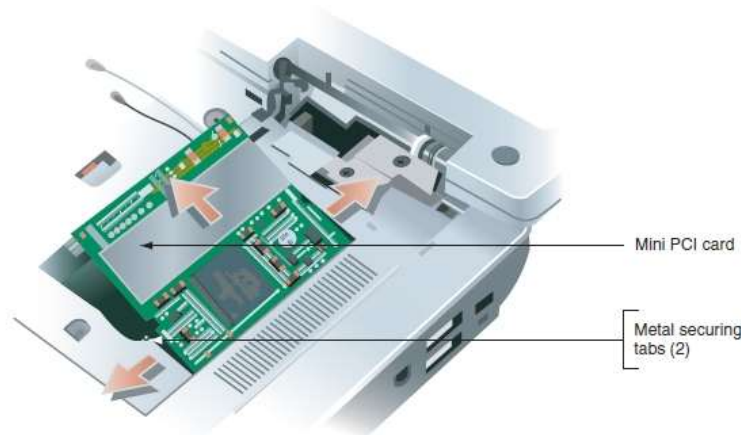


Figure 11-71 Remove a Mini PCI Card
Courtesy: Course Technology/Cengage Learning

Disassembling and Reassembling a Notebook Computer (cont'd.)

- Replacing the card:
 - Align card in the cavity
 - Press down until it pops in place and secures tabs
 - Reconnect the wireless antenna cable
 - Replace keyboard and hinged cover
- Distinguishing between Mini PCIe and Mini PCI slot
 - Clips on the side of the Mini PCI slot
- Distinguishing between Mini PCIe and Mini PCI card
 - Notches on sides of a mini PCI card
 - Long, unbroken edge connector on the card

Disassembling and Reassembling a Notebook Computer (cont'd.)

- Mini PCI and Mini PCI Express cards
 - Enhance notebook communications options
- Features when selecting Mini PCI or Mini PCIe card:
 - Bluetooth comes in three versions
 - Use a later version of Bluetooth
 - Some Mini PCI and Mini PCIe provide both Wi-Fi and Bluetooth ability
 - Mini PCI Express slots are not backward compatible with Mini PCI slots

Disassembling and Reassembling a Notebook Computer (cont'd.)

- Replacing the motherboard and CPU:
 - Run diagnostic software to verify problem
 - Use CPU supported by manufacturer and notebook model
 - Replacing the motherboard requires complete disassemble of the entire notebook
 - Except LCD assembly

Disassembling and Reassembling a Notebook Computer (cont'd.)

- Diagnosing dim or black LCD panel:
 - Connect external monitor to video port
 - Toggle between LCD panel, external monitor, and both the panel and monitor
 - If external monitor works: LCD panel assembly likely broken
 - If LCD display entirely black: replace LCD assembly
 - If LCD display dim: video inverter problem
 - Consider field replaceable units
 - High-end notebooks contain video card
 - May need to replace it too

Disassembling and Reassembling a Notebook Computer (cont'd.)

- How to replace an LCD panel assembly:
 - Remove AC adapter and battery pack
 - Remove the keyboard
 - Remove screws holding hinge in place
 - Remove hinge cover
 - Remove screws holding LCD panel to the notebook
 - Remove LCD panel from the notebook
 - Remove screws holding the top cover and LCD panel
 - Disconnect old inverter and install the new one
 - Reattach LCD panel assembly to the notebook

Summary

- A notebook (laptop) is a portable computer
 - OS build: notebook OS customized by the OEM
 - PCMCIA develops standards
 - PC card, CardBus, ExpressCard slots
 - Power Options Properties
 - Configures AC and DC power management schemes
 - Input devices include:
 - Keyboard, mouse, graphics tablet

Summary (cont'd.)

- Troubleshooting notebooks:
 - Like troubleshooting desktops
 - Memory and hard drive are doable
 - Other components are harder
- Notebook memory modules include:
 - SO-DIMMs, SO-RIMMs, MicroDIMMs
- Additional topics covered:
 - Mini PCIe and Mini PCI specifications
 - Motherboard, CPU, and LCD panel replacement